

On the Pulse

We are very pleased to present our 'On the Pulse' kit. Thank you for bringing this kit of engaging, hands-on resources and activities to your students. We have included some suggestions that will have students working towards outcomes from Science and Technology, Geography, English and Mathematics syllabuses.

The kit includes:

- Lego® Minifigure pieces (to make up to five characters) for students to use in creative writing, researching or role play activities. You may choose to use your Lego® Minifigure as the 'face' of any communication that you share with the school community.
- Broad bean seeds to grow either in the pots supplied or in your school garden. The broad bean plants can be used for activities including investigating variable growing conditions, scientific illustration or measurement.
- Mung beans for sprouting and eating or investigating preferred growing conditions.
- Chickpeas for cooking or preparing and eating.
- Career profile cards of a range of roles in the pulse industry.
- Pulse information sheets from Pulse Australia and the International Year of the Pulse.
- A link to electronic copies the 'On the Pulse' Kit contents as well as a range of other resources from Pulse Australia.

Your student's first question may be ...

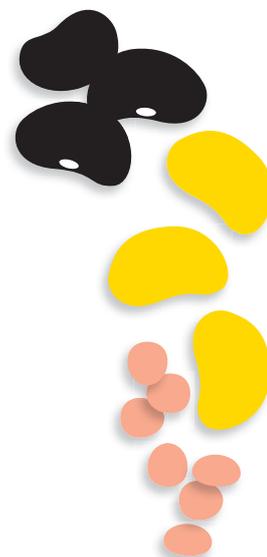
What is a pulse?

According to the International Year of the Pulse [website](#) pulses are the 'dry, edible seeds of plants in the legume family ... (that is) ... a category of superfoods that includes chickpeas, lentils, dry peas, and dry beans. They're incredibly healthy, which is one reason the United Nations declared 2016 as the International Year of Pulses.'

There are some very useful infographics and images on the International Year of the Pulse website that will help students to understand what we mean when we talk about pulses.

Suggested activities

Many of the activities suggest that students record their discussions, thoughts or observations. There is a range of ways that you can choose to have them do that and we don't want to be prescriptive about that. You may want them to practice a particular text type and this is an opportunity to do that; you may like to use the activities to work towards a visual arts outcome; try a digital storytelling app; have students prepare a video report to present to the school community; or design a digital presentation.



Early stage 1

Sprout houses:

Using the house template, plastic bags, cotton wool and water students can sprout seeds on the window!

Talk about why you have added water, why they are taped to the window and what you would need to do with the germinated seed for it to grow to a mature plant?

Use the germinating seeds and sprouts as a stimulus for information reports, introducing the idea of a science journal.

Once the seeds have germinated you can put them in pots with some soil so they continue to grow. Use the comparative heights of the plants to reinforce student's understanding of length and the growth of living things.

Students will be able to sequence the images of a broad bean plant growing as they observe their plants growing.

Science / Natural Environment: A student identifies the basic needs of living things (STe-8NE)

English: A student responds to and composes simple texts about familiar aspects of the world and their own experiences (ENe-11D)

Mathematics: A student sequences events, uses everyday language to describe the durations of events, and reads hour time on clocks (Time) MAe-13MG and/or describes mathematical situations using everyday language, actions, materials and informal recordings MAe-1WM and/or uses concrete materials and/or pictorial representations to support conclusions MAe-3WM and/or describes and compares lengths and distances using everyday language (Length) MAe-9MG

Picture pulses:

Look at some of the images of pulse farming found on the Pulse Australia fact sheets or search the internet for images of Australian pulse farms. Discuss with students that types of things that they have at their homes, are they different or the same as those found in the images (eg tractors, crops, houses, dogs, sheds etc). How would the farms that contain these items be arranged compared to their homes. Students can arrange a farm by either drawing one or cutting out and placing images of things found on pulse farms.

Science / Made Environment: A student recognises how familiar products, places and spaces are made to suit their purpose (STe-10ME)

Careers

Look at and discuss the career cards. Where would these people be found? Do they work on the farm or are they somewhere along the supply chain and located in towns or cities that provide services to farms? Map where the people that do these roles might live on a map of New South Wales or Australia. Note there is a map of pulse growing regions on the information flyer 'Australian Pulses'.

Choose one and think about the things that they would need to do their job.

Geography: A student communicates geographical information and uses geographical tools (GEe-2) and identifies places and develops an understanding of the importance of places to people (GEe-1).

Cooking

Pulse Australia and a quick internet search reveal a world of health benefits and recipes for preparing, cooking and eating pulses including chickpeas and mung bean sprouts. Ensure your time with this kit includes time for students to share their favourite pulse recipes and to try something new.

Stage 1

Sprouting Food

Put some mung bean sprouts in cotton wool on three different plates and discuss with students where pulse farmers would be growing their crops (in soil) and where it comes from - compare that to the growing medium that you are using.

Discuss the other inputs that plants need - sunlight and water. Apply water to the three plants differently; keep one flooded, water one only as the cotton wool dries out and water one only once or twice.

Students can record the changes in the seeds/plants every few days and compare how each water treatment is affecting the plant growth.

Discuss the importance of using water efficiently and how farmers might decide just the right amount of water to use on their pulse crops.

Note: The mung bean shoots can be eaten and there are lots of recipes available online. If you would like them to look like the ones that are for sale in produce stores (no green) they can be sprouted in dark containers - again there is a lot of guidance about this online. This can be a stimulus for a discussion about consumer expectations and how natural growing systems are manipulated to cater for that.

Science / Earth and Space: A student identifies ways that people use science in their daily lives to care for the environment and the Earth's resources (ST1-9ES)

Mini-me

Search on the internet for images or time lapse photography of plants growing. You will be able to find one of a bean plant germinating and growing. Compare the mature seed and seed pod to the seeds that you received in your kit. Discuss the germinating seed, plant growth and growth of the seed pod, from which new plants can grow. How does this drive the pulse farming system?

Science / Living World: A student describes external features, changes in and growth of living things (ST1-10LW) and describes ways that different places in the environment provide for the needs of living things (ST1-11LW)

Growing Changes

Plant the broad bean seeds in pots and house them in different growing conditions eg one on the window sill, one in a cupboard and one in all day sunlight. Discuss why the plants are growing at different rates or look different.

Note: It may be two weeks before the broad bean shoots are visible, in the meantime show students some time lapse video of germinating seeds and discuss what is happening under the surface of the soil. You may choose to place one seed on cotton wool so students can see what is happening in the soil.

Science / Living World: A student describes external features, changes in and growth of living things (ST1-10LW) and describes ways that different places in the environment provide for the needs of living things (ST1-11LW)

Nature journaling

Have students record the changing seed as it germinates and the growth of the plant either by drawing the plants every few days or by photographing it to make your own time lapse video.

Visual Arts: VAES1.1 Makes simple pictures and other kinds of artworks about things and experiences.

Farm tools

Compare the design of different farm equipment and how they are designed for different purposes. Consider your student's current level of understanding of farming practices. You can compare broad bean harvesters to wheat harvesters or citrus harvesters or you might consider the differences between harvesting equipment and planting equipment. There are a lot of images and diagrams available online for you to use to stimulate discussion and as stimulus for recording the differences.

Science and Technology / Products: A student describes a range of manufactured products in the local environment and how their different purposes influence their design (ST1-16P)

Sharing and multiplying pulses

We have included a sheet containing images of pots and/or containers. Help students share the seeds amongst the students in the class. Students can then use appropriate strategies to put even amounts of seeds in each 'pot'. If all of the seeds grow to mature plants and produce (x) fruit, how many broad beans will the class have grown all together?

Math / Multiplication and division: A student describes mathematical situations and methods using every day and some mathematical language, actions, materials, diagrams and symbols MA1-1WM and uses a range of mental strategies and concrete materials for multiplication and division MA1-6NA.

Where is the pulse?

Consider the different roles involved in the pulse industry in Australia - using the set of career cards. For each of the roles students will be able to suggest why they are located where they are (or where they are likely to live). Each of the roles can be located on the map of NSW.

Discuss with students the way that the people in these roles interact with each other along the supply chain and how they care for places - to the benefit to others along the supply chain.

Geography / Features of Places: A student describes features of places and the connections people have with places (GE1-1) and identifies ways in which people interact with and care for places (GE1-2).

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Stage 2

Pulse Farming

Discuss with students their understanding of farming activities - in particular those on pulse farms. View some images of pulse farming to help students deepen their understanding of farm activities. How do they think these activities change the Earth's surface? How does that compare to the way new residential areas changes the Earth's surface? View some aerial crop farming images online to help with the discussion.

Science and Technology / Earth and Space: A student describes some observable changes over time on the Earth's surface that result from natural processes and human activity (ST2-8ES)

Will it grow?

Take students into the playground or a nearby park and ask them to find (and collect if it won't damage them) examples of living and non-living objects. Discuss ways that they could group them and how does that help them to decide if they are living or non-living? Plant the broad bean seeds in a cup filled with paper towel or cotton wool (with the seed on the outside so it can be seen). Place a non-living object in the same situation. Over the next few weeks observe and record the changes you see in both objects. Once the seed has germinated plant it in soil so it continues to grow (discuss with students why it is better to do this). Have students record both objects for the same length of time and discuss what changes occurred in both.

Science and Technology / Living World: A student describes that living things have life cycles, can be distinguished from non-living things and grouped, based on their observable features (ST2-10LW) and describes ways that science knowledge helps people understand the effect of their actions on the environment and on the survival of living things (ST2-11LW)

How big will it grow?

Research how big broad bean plants grow and how much space they need in a garden. Help students to plan a garden on a grid layout and plan space for the broad beans allowing room for some others plants.

Maths / Position: A student uses appropriate terminology to describe, and symbols to represent, mathematical ideas MA2-1WM and uses simple maps and grids to represent position and follow routes, including using compass directions MA2-17MG

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Pulse Careers

Discuss with students the different careers represented in the career profile cards. Where would these roles generally be found? Would they be likely to be in your local area? Have students discuss and record aspects of the characters' lives - you could map them on a map of NSW or Australia. Have student choose one of the characters/careers that is least like to be found in their local area and research what their home is probably like for example if you live in a rural farming area students may choose a grains trader or a processing plant worker. Describe what their commute to work might be like - what do they see out the window compared to your trip to school? Record and display students' findings and comparisons to their home life.

Geography / Places are Similar and Different: A student describes the ways people, places and environments interact (GE2-2)

Stage 3

What's in the dirt?

Plant the bean seeds in pots with different soils, one clay, one sand and one potting mix. Discuss how the quality of soil affects the growth of plants. Research the various ways Australian farmers improve soil health to grow healthy crops. Record and display students' findings.

Science and Technology / Living World: A student describes some physical conditions of the environment and how these affect the growth and survival of living things (ST3-11LW)

Where is the pulse?

Discuss with students the Australian Growing Areas map. Why are pulses grown in those locations? Think about what plants need to grow? How are their needs met in those areas where they are not in other areas? Ask students to design an experiment to replicate the effect of differing growing conditions.

Science and Technology / Living World: A student describes some physical conditions of the environment and how these affect the growth and survival of living things (ST3-11LW)

Who grows the pulse?

Look at the set of careers cards. Discuss with students where each of the careers fit into the supply chain or the production system. Research where and how each of the links in the supply chain work together. Ask students to consider what would

happen to the supply of pulses if any of the links failed. Can they design a replacement or improvement on the current way of achieving that part of the system?

Research the range of pulses available to purchase in Australia. Are they all grown here? Why or why not? Where do they come from? Are all the pulses grown in Australia consumed here?

Why or why not? How does the import and export system meet the needs of people?

Science and Technology / Products: A student describes systems used to produce or manufacture products, and the social and environmental influences on product design (ST3-16P), and

Geography / A Diverse and Connected World: A student explains interactions and connections between people, places and environments GE3-2

How much water?

Water is a topical issue in agriculture. A good way to investigate this with students is by talking about how much water your broad bean plants will need. While the amount of water needed while gardening and farming is usually decided based on soil moisture rather than a figure obtained from a book, you can use this activity to investigate capacity if you choose simple figures. Pose a problem for your students to solve for example 'if our broad beans need 1000 millilitres of water every two days and we have 22 plants in the garden, how many 10 litre containers of water will we need to take to the garden each week?'

Discuss with students the issue of water allocation. Farmers need to know that they have access to enough water and a way of delivering it to plants (if rainfall proves insufficient) before deciding what they will grow.

Math / Volume and Capacity: A student selects and uses the appropriate unit to estimate, measure and calculate volumes and capacities, and converts between units of capacity MA3-11MG

Science and Technology / Living World: A student describes some physical conditions of the environment and how these affect the growth and survival of living things ST3-11LW

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Year 7-10 Life Skills

Watch it grow!

Students can observe and record the growth of broad beans or mung bean shoots as they develop from seed through germination and mature plants. The growth diagram included in the kit can be used to identify each stage of plant growth and students may like to record how long it takes the plants to reach each stage and how much water they used.

Students can record the development by drawing each of the stages or by photography and producing a time-lapse video of their plants.

Science and technology / Living World: Structure and Function: A student recognises features of living and non-living things SCLS-17LW and identifies structures of living things and their functions SCLS-18LW

Math / Time: Calculating and Measuring Time: A student responds to and uses mathematical language to demonstrate understanding MALS-1WM, applies mathematical strategies to solve problems MALS-2WM, uses reasoning to recognise mathematical relationships MALS-3WM and calculates and measures time and duration in everyday contexts MALS-23MG.

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Also available from the NSW Department of Primary Industries schools program:

Teaching resources

Investigate science and technology competition

Investigate is an annual competition designed to provide authentic learning experiences to support stage 3 students' learning in science and technology. By participating in the *Investigate* competition students will understand and value the role that science plays in their everyday lives. The 2016 *Investigate: fire ants* competition unit of work is now available on our website. *Investigate: aphids* will run in Term 1 2017.



Dairy science and technology at the historic Belgenny Creamery

Students undertaking these units consider the way that science and technology have changed and improved agriculture over time. The units link to the Science and Technology K-6 syllabus while incorporating understanding and development of knowledge from geography, maths, English and history and incorporating critical and creative thinking. The units are supported by videos, diagrams, learning journals and an interactive timeline. Online visits coming soon!

Teacher professional development



AgPatch: garden connections online course guides primary teachers in the integration of a school garden into classroom practice and for connecting it to local primary industries.

These resources and others can be found at
www.dpi.nsw.gov.au/education-and-training/school-resources

Contact DPI Schools team at email: schools.program@dpi.nsw.gov.au